Project Report for:

Southeast Alaska Water Quality Inventory

Alaska Clean Water Actions Grant no. 17-13

June 30, 2017

Southeast Alaska Conservation Council

Prepared by: Rebecca Bellmore

With support from Guy Archibald, Hannah Wilson, and Emily Ferry

Table of Contents

Abbreviations

ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
AKMAP	Alaska Monitoring and Assessment Program
AWQMS	Ambient Water Quality Monitoring System
CCTHITA	Central Council of Tlingit and Haida Indian Tribes of Alaska
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
SEACC	Southeast Alaska Conservation Council
USGS	U.S. Geological Survey
USFS	U.S. Forest Service

Project Summary

The Southeast Alaska Conservation Council (SEACC) proposed a comprehensive water quality and data inventory of Southeast Alaska's waters stretching from the Yakutat area to Ketchikan. The goal of the project was to understand what areas have baseline water quality data, where there are gaps, and help provide a foundation for future studies in the region.

We solicited water quality information from local governments, organizations, universities, state and federal agencies, tribes, businesses, and non-governmental organizations that have collected data in Southeast Alaska. Water, sediment, and fish tissue data was solicited. Data parameters for inclusion were limited to physical field parameters, such as turbidity, solids, conductivity, dissolved oxygen, and temperature. Additionally, inorganic parameters, such as total and dissolved metals, nutrients, hardness, and alkalinity, and organic parameters, such as petroleum, hydrocarbons, polyaromatic hydrocarbons were included. The quality of the data was assessed for adherence to standard laboratory and sampling methods, presence of a quality assurance project plan (QAPP), adequate detection limits, data quality flags, and laboratory and/or field narratives where available. SEACC and ADEC agreed not to include data already submitted to ADEC under different programs and not to include data on waterbody physical characteristics such as stream channel morphology, aquatic vegetation, percent shaded cover, etc. We also did not include fisheries-specific data such as escapement, egg to fry ratios and outward migration or diversity and population data.

As a result of project efforts, we collected and submitted sixteen data sets to ADEC and identified data sharing methods that are meaningful for researchers and resource managers as well as the general public. Submitted data sets had monitoring locations that were distributed across Southeast Alaska and Canada, data appeared to be denser around population centers, with a few locations in northern Southeast Alaska. Most of the data sets identified were chemical water quality parameters such as nutrients, metals, inorganics, and physical parameters such as temperature and pH. We identified only a limited amount of data associated with sediments, and received little tissue data. The report recommends next steps for both data collection and collaboration.

Outreach

Approach

SEACC reached out to individuals from organizations in Southeast Alaska that are known or likely to have conducted water quality studies in the region. We generated a list of these organizations based on known studies and/or an understanding that water quality data collection may be relevant to their missions. Outreach to individuals was tiered to maximize responses: We began with individuals with whom we have personal relationships and requested any data that they might have and any information about other sources of data that we should pursue. These secondary (and sometimes tertiary) leads were also pursued. We also followed up on leads provided by ADEC about known projects in the region. Finally, we made

cold calls and/or emailed to individuals in organizations that we suspected had data, but with whom we did not have other connections.

After data sets were obtained, they were evaluated for completeness. SEACC followed up where necessary with requests for additional documentation or information. In several instances, we contacted the laboratory responsible for analyses after receiving a release of confidentiality in order to fill gaps in the data or metadata. In cases where the original investigator was no longer available, we worked with the department or organization staff to complete the data set.

Through these outreach efforts, we connected with:

Tribal organizations:

- Central Council Tlingit and Haida Indian Tribes of Alaska (CCTHITA)
- Craig Tribal Association
- Douglas Indian Association

Watershed/Conservation Councils, Non-Profits:

- Friends of Admiralty Island
- Juneau Watershed Partnership
- The Nature Conservancy
- Sitka Conservation Society
- Southeast Alaska Fish Habitat Partnership
- Southeast Alaska Watershed Coalition
- Takshanuk Watershed Council
- Yakutat Salmon Board

Businesses:

- Coeur Alaska Mining Company
- Hecla Mining Company
- Kai Environmental Consulting

State Agencies:

- Alaska Department of Fish and Game (ADFG)
- Alaska Department of Transportation

Federal Agencies:

- U.S. Fish and Wildlife Service
- U.S. Forest Service (USFS)
- U.S. Geological Survey (USGS)
- U.S. National Park Service

Other:

- City and Borough of Juneau Water Utility
- University of Alaska Southeast

Two organizations, Yakutat Tlingit Tribe and Prince of Wales Watershed Association, did not respond to outreach attempts.

Results

We obtained 16 data sets from various entities that were potentially suitable for submission to the Ambient Water Quality Monitoring System (AWQMS). These included large compilations of data from various studies in the Stikine and Taku River watersheds (data compiled but not originally collected by ADFG). Of the data sets we obtained, all have been submitted to ADEC and are described in more detail in the sections below (and see Appendix 1).

Several data sets that we received were ultimately not submitted. Among these were components of the data compilations by ADFG because SEACC was unable to locate critical quality assurance/quality control (QA/QC) information (e.g. monitoring locations, methods) and complete formatting requirements for AWQMS during the project period. Additionally, we received continuous monitoring data from several stream sites that were collected by the U.S. National Park Service, but these were not submitted because ADEC did not indicate that continuous data were a priority and the AWQMS templates provided were not applicable (these data are publicly available). Finally, we received data associated with extensive water quality monitoring by the USGS at its gage site on the Stikine River, but these data are also publicly available with robust QA/QC information, so they were not submitted. (See Appendix 2 for more information).

An additional nine studies were identified as potentially suitable for AWQMS, but SEACC was unable to obtain them for a variety of reasons (Appendix 3). In some cases, host organizations could not find or did not have time to search for the raw data during the project period. In others, organizations were in the process of analyzing and publishing studies, or the organization simply did not respond to repeated requests for information after initial contact.

Description of Data

Data Collection Locations:

The submitted data sets included sampling sites across Southeast Alaska (Figure 1). Non-agency organizations primarily collected samples from water bodies in the Juneau area and near Sitka and Craig, as well as in areas that are or may be affected by mining operations (Figure 2). This distribution reflects sites that are that are readily accessible from communities and/or at-risk water bodies that support subsistence resources (e.g transboundary water bodies, Hawk Inlet) (Figure 2).

Sample Parameters:

- Common physical parameters included temperature, turbidity, total suspended solids, total dissolved solids, conductivity, specific conductivity, salinity, and hardness.
- Total metals present in sediment, fish, and invertebrate tissue, and total and dissolved metals in the water column.

- Also measured were ammonia, pH, alkalinity, oxidation reduction potential, polycyclic aromatic hydrocarbons, organic carbon, ammonium, nitrate, nitrite, total nitrogen, total dissolved nitrogen, phosphate, total phosphorus, silica, calcium, magnesium, fluoride, carbonate, bicarbonate, hydroxide, chlorophyll-a, arsenic and sulfate.

Sample Matrices:

- Sediment, tissue, and water column data in Hawk Inlet and contributing streams.
- Sediment data in Taku Inlet and on a Douglas Island beach.
- Water column data in transboundary waters, specifically the Tulsequah, Stikine, Taku, and Klehini River watersheds.
- Water column data in several rivers and streams near Juneau, Craig, and Sitka, and in Redoubt Lake.
- Region-wide stream and river water column data collected as part of two synoptic surveys.

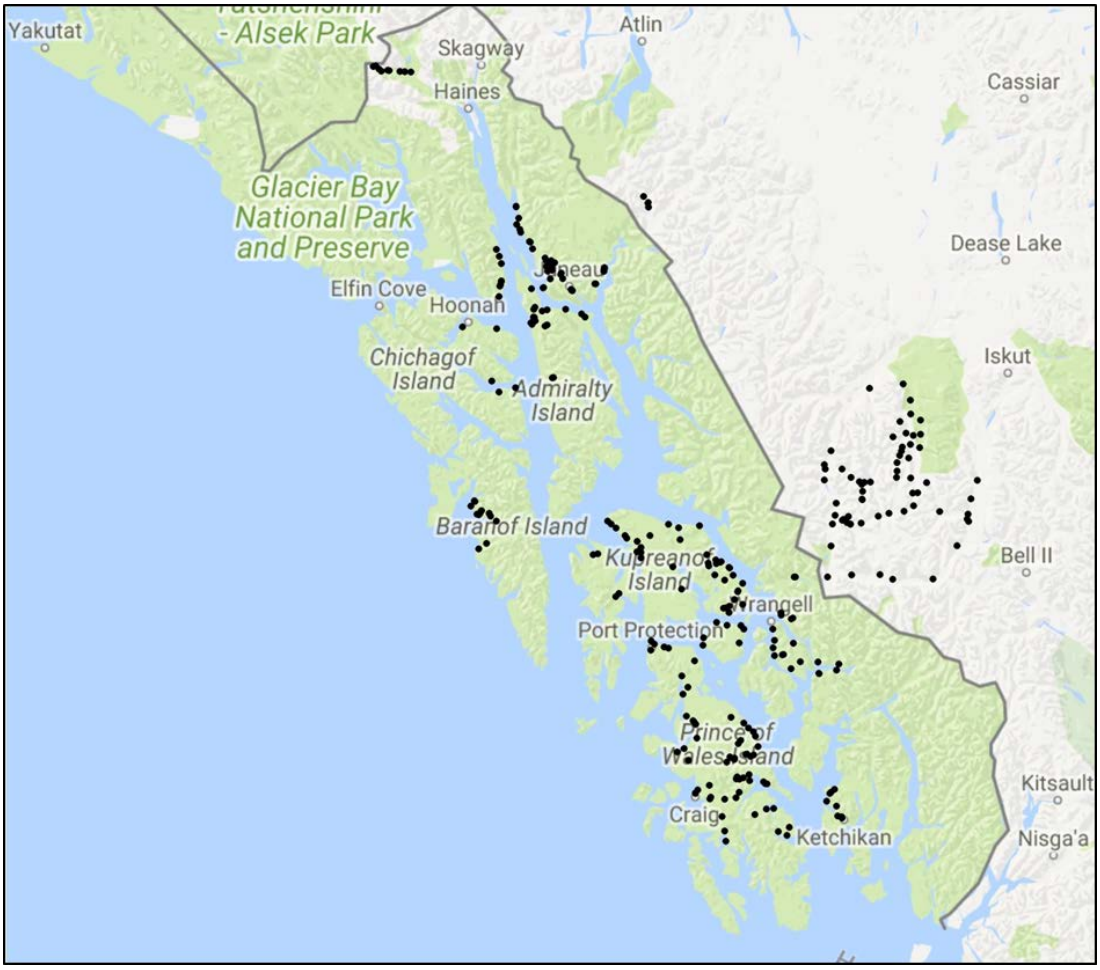


Figure 1. Data collection sites associated with studies submitted to ADEC.

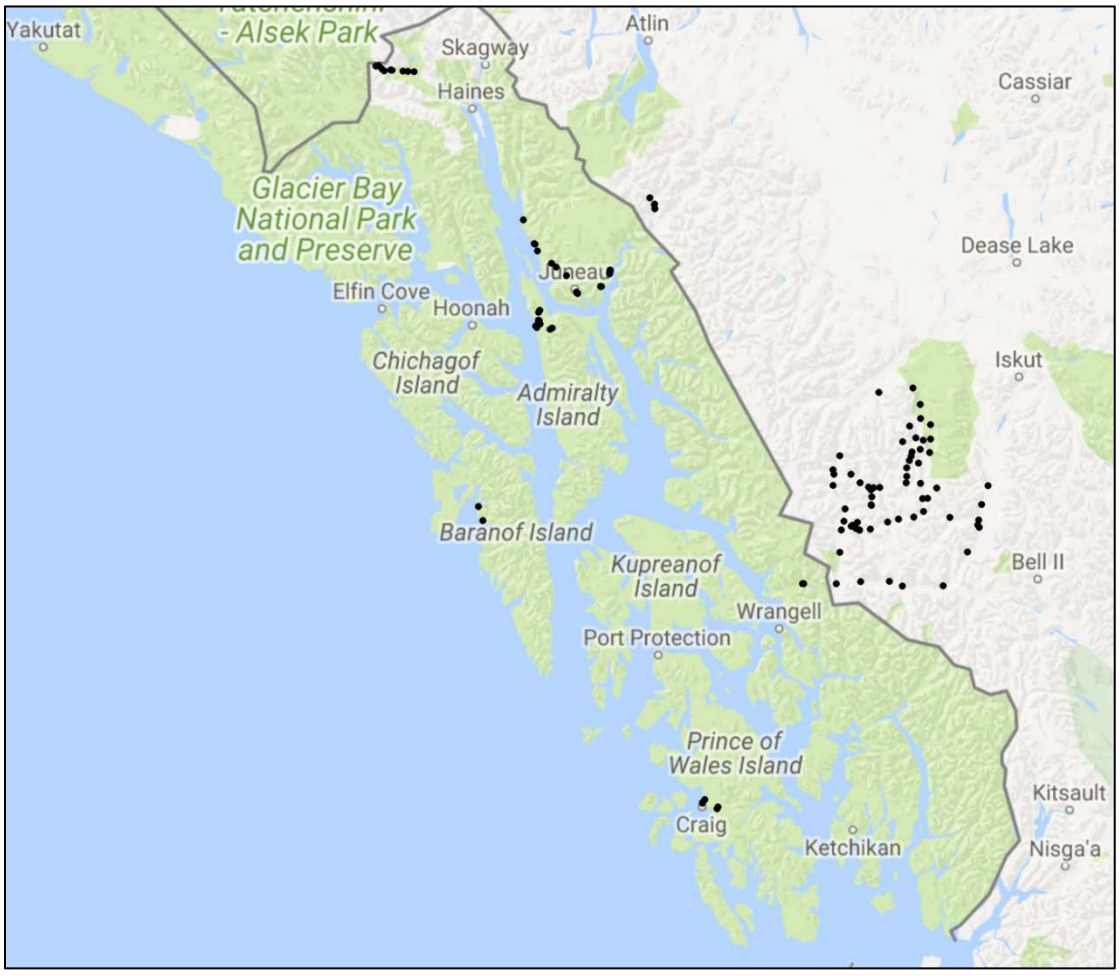


Figure 2. Non-agency data collection sites. Other than transboundary sites, data were generally collected in locations that were easily accessible from communities and/or important for subsistence reasons.

Data Quality and Gaps Assessment

The spatial distribution of sampling sites was uneven across the region (Figure 1). Other than a study in the Klehini watershed northwest of Haines, there were no sampling locations north of the Juneau area, and there were few sampling locations on Admiralty, Baranof and Chichagof Islands (Figure 1). In addition to spatial gaps, the data density, in terms of number of parameters measured and number of sampling dates, were not evenly distributed across the region (Figure 3). Although there were many sampling sites in southern Southeast, they had limited data associated with them, as most study sites were associated with synoptic sampling efforts by the USFS where few parameters were measured, and sites were visited only one to three times (Figures 4). In contrast, the area around Juneau had sites with more analytes measured on more dates (Figure 5).

Study locations were predominantly located in streams and rivers (Figure 6). There were a few estuary locations in Hawk Inlet and in Taku Inlet, while the only ocean locations were associated with beach sampling on Douglas Island and one location near Hawk Inlet. Additionally, data from only one lake – Redoubt Lake on Baranof Island – was submitted. (We identified extensive USFS lake studies for the region, but staff was unable find the raw data.)

We also explored the spatial distributions of where specific parameters and matrices were measured. Metals were measured in relatively few study sites, but these were focused in transboundary watersheds and Hawk Inlet, where there are water quality concerns related to mining activities (Figure 7). Turbidity was also measured at the transboundary watershed sites, as well as sites in the Juneau area that were associated with studies of organic matter, nutrients and hydrology (Figure 8). In contrast to metals and turbidity, temperature was widely measured (Figure 9). However, these temperature data generally represent isolated time points, and without more context are not likely to be useful in comparative or temporal studies of water temperature in the region. The vast majority of data were associated with water column samples. Sediments were analyzed only in Hawk Inlet and Taku Inlet estuary sites and Douglas Island ocean sites, while tissues were analyzed only in some Hawk Inlet sites.

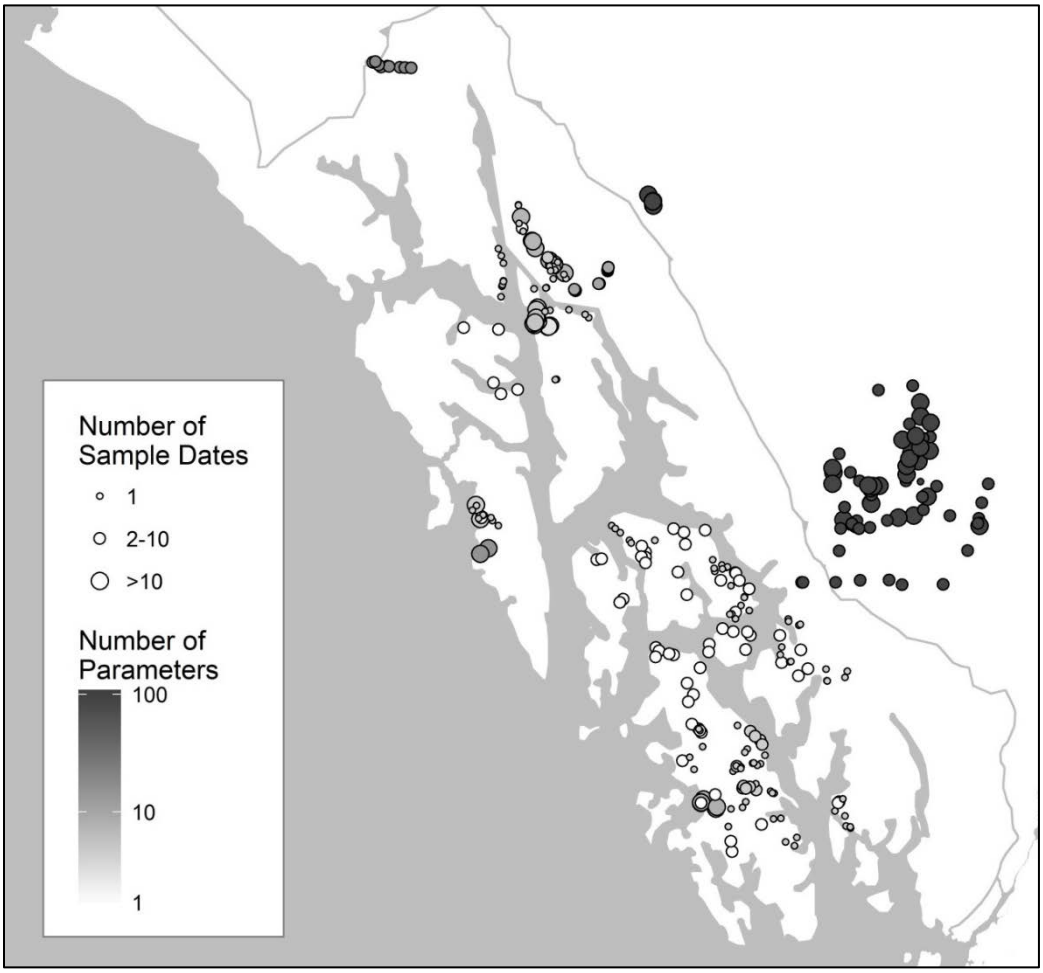


Figure 3. Data density at study sites, in terms of number of sampling dates and number of different parameters measured.

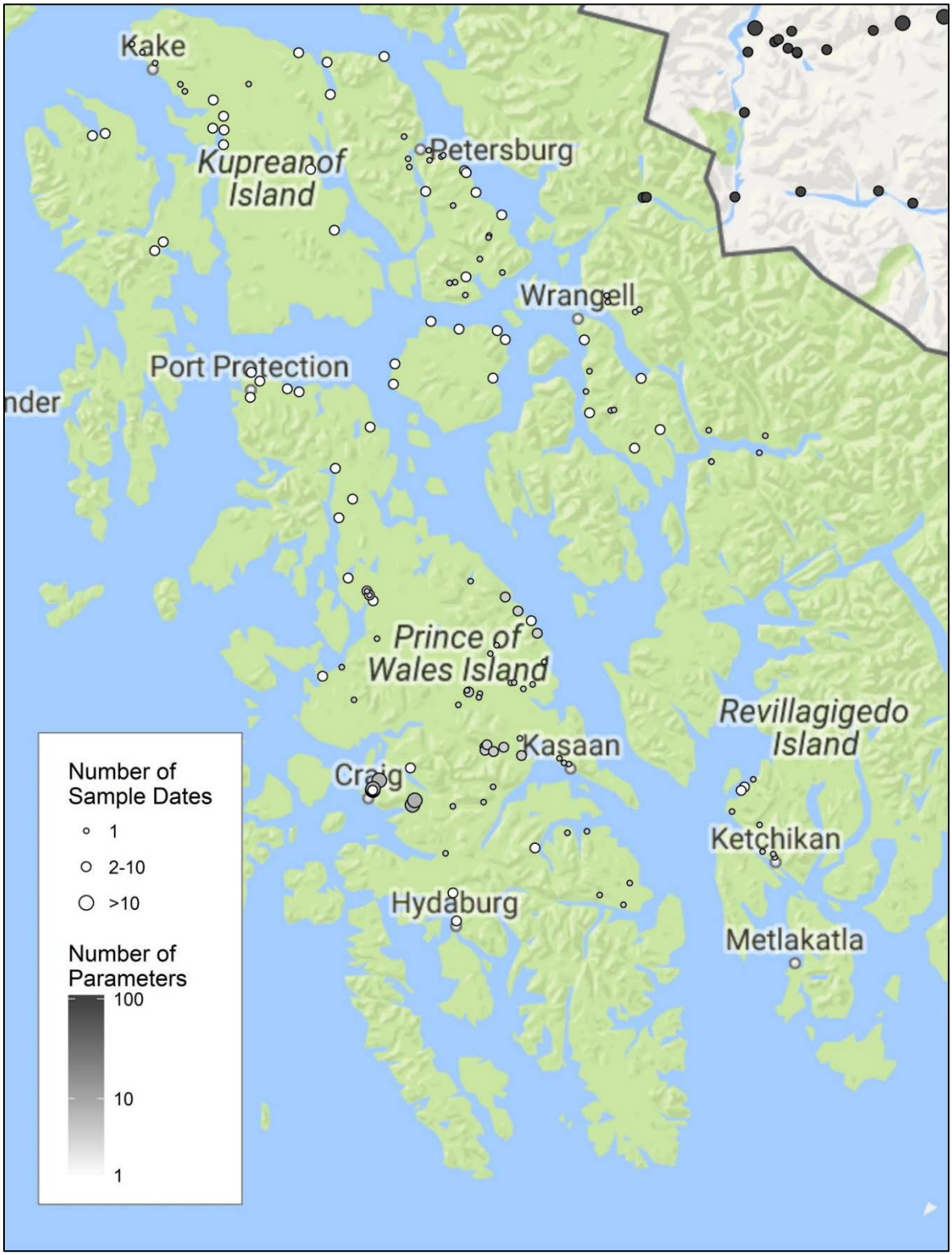


Figure 4. Data density at sites in southern Southeast Alaska, in terms of number of sampling dates and number of different parameters measured.

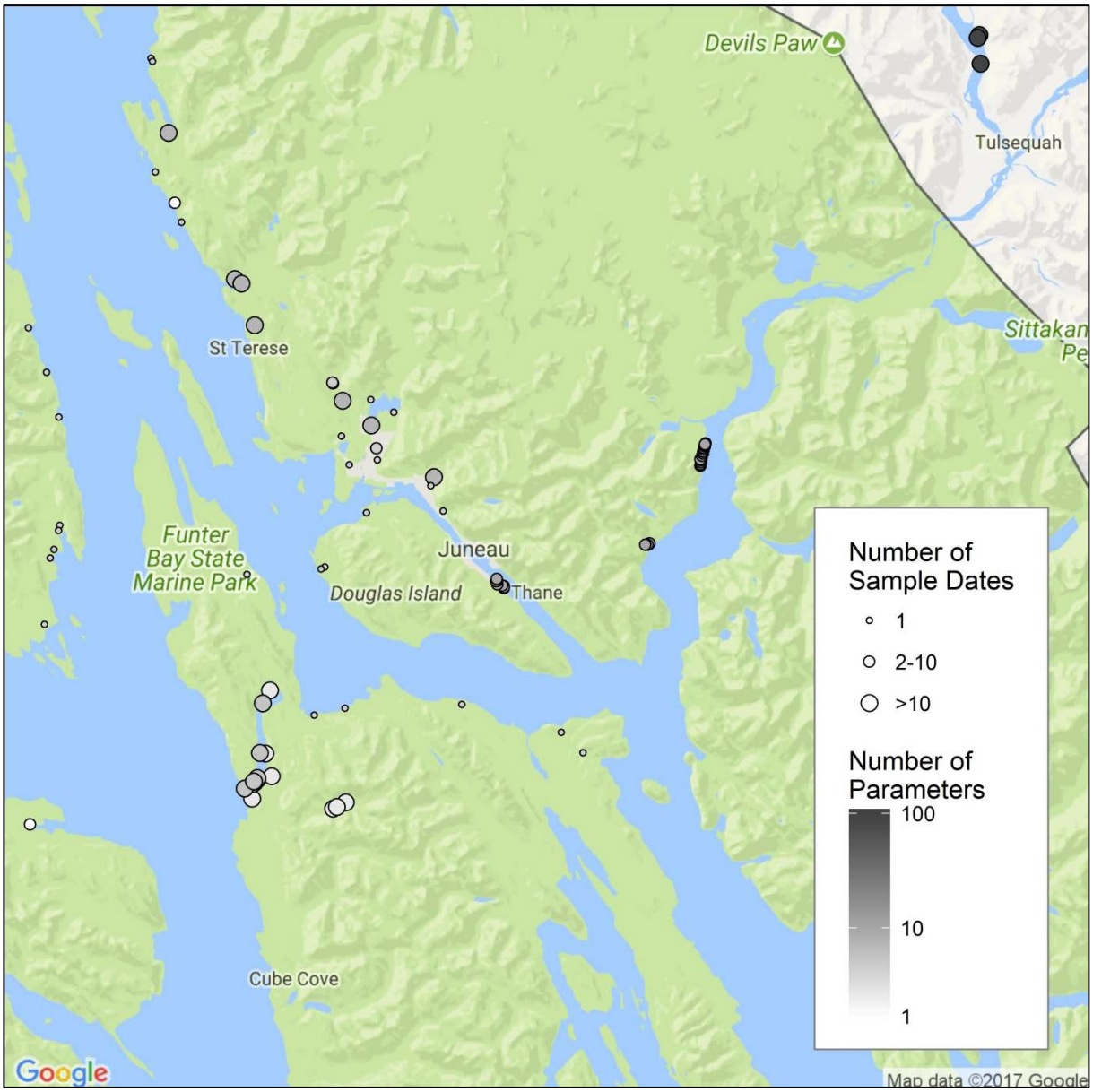


Figure 5. Data density at sites in the Juneau-area, in terms of number of sampling dates and number of different parameters measured.

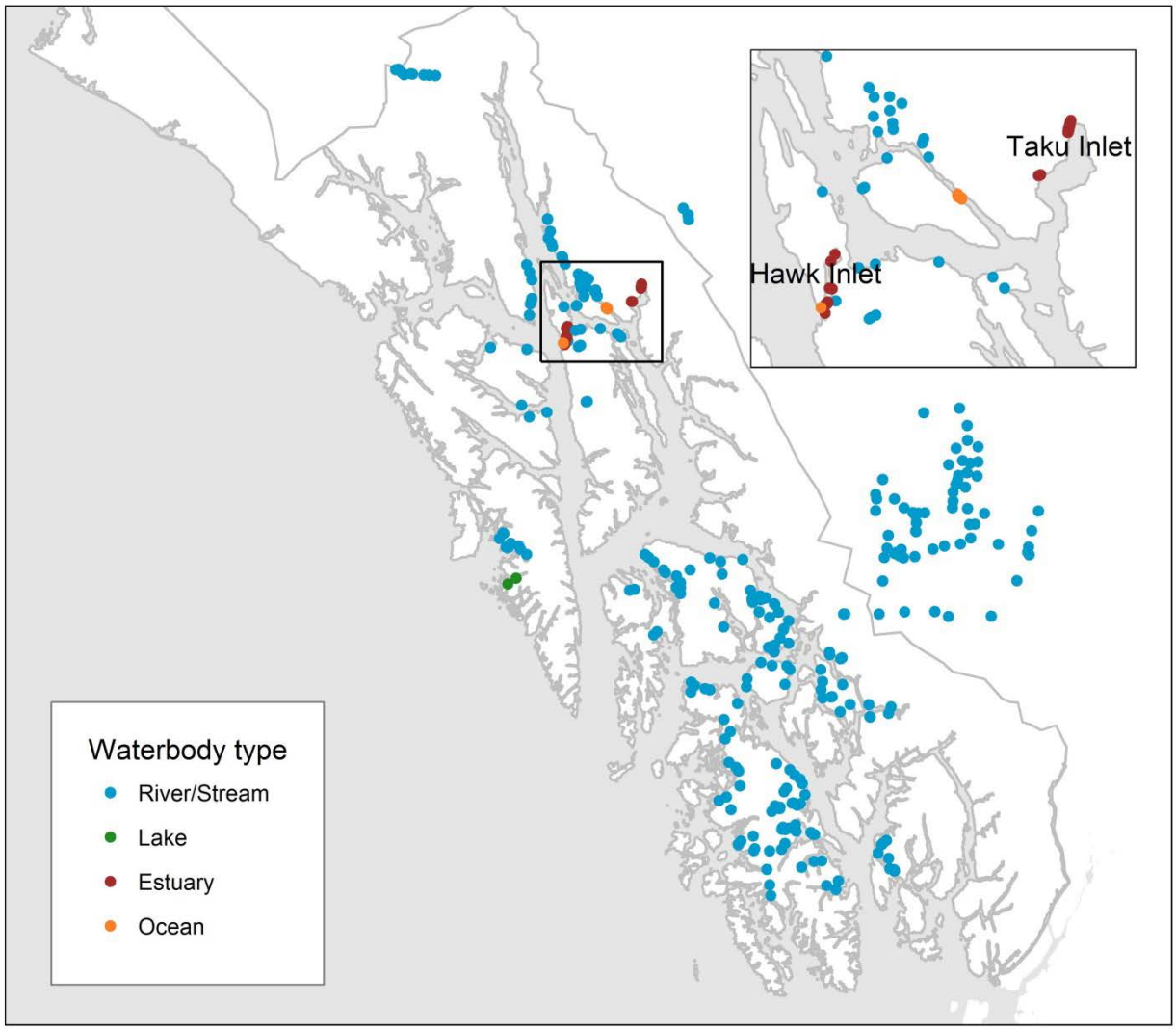


Figure 6. Water body types sampled. Inset shows the area near Juneau, including Taku Inlet and Hawk Inlet on the northwest side of Admiralty Island.

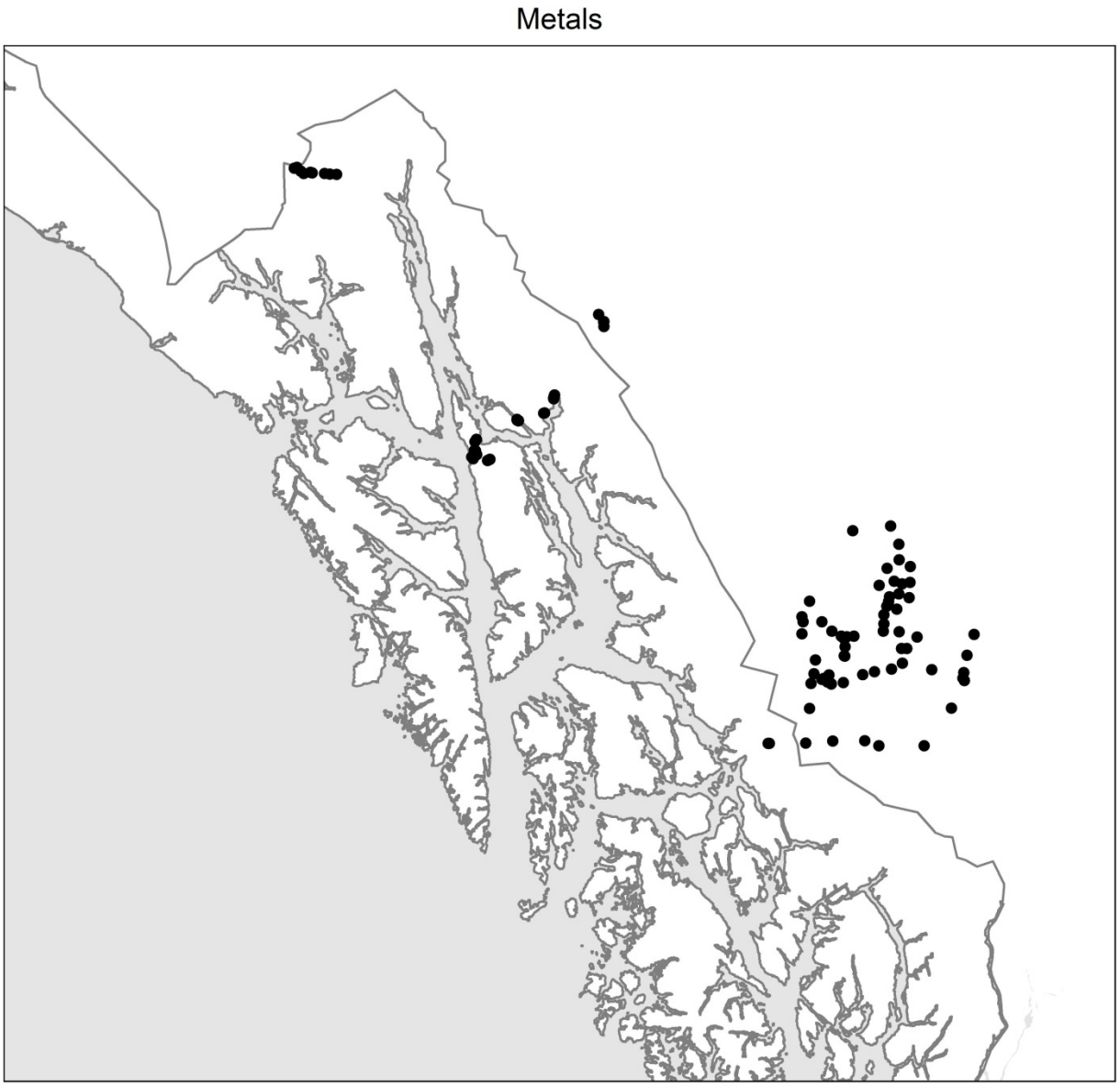


Figure 7. Sampling sites where metals were analyzed at least once.

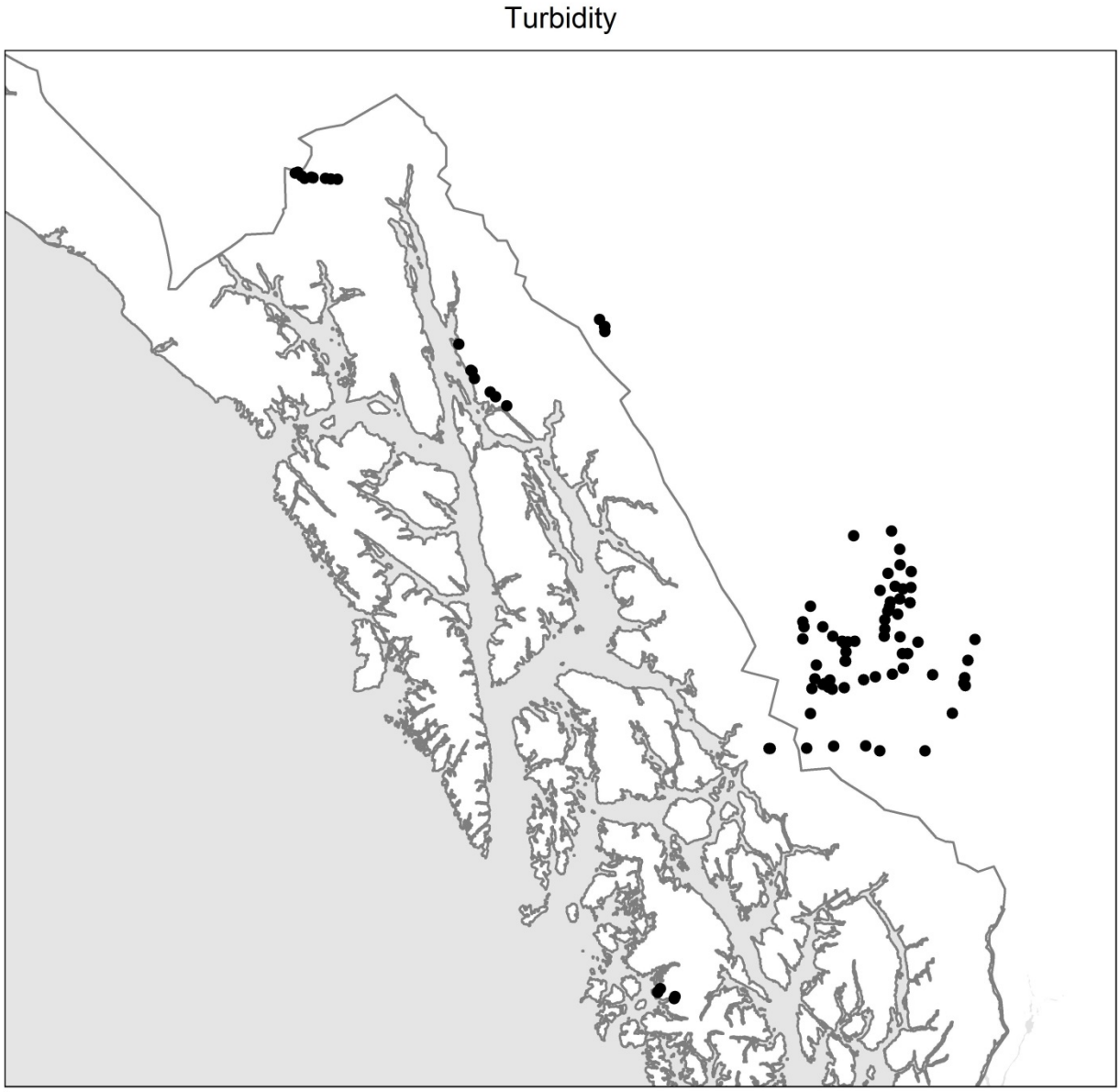


Figure 8. Sampling sites where turbidity was measured at least once.

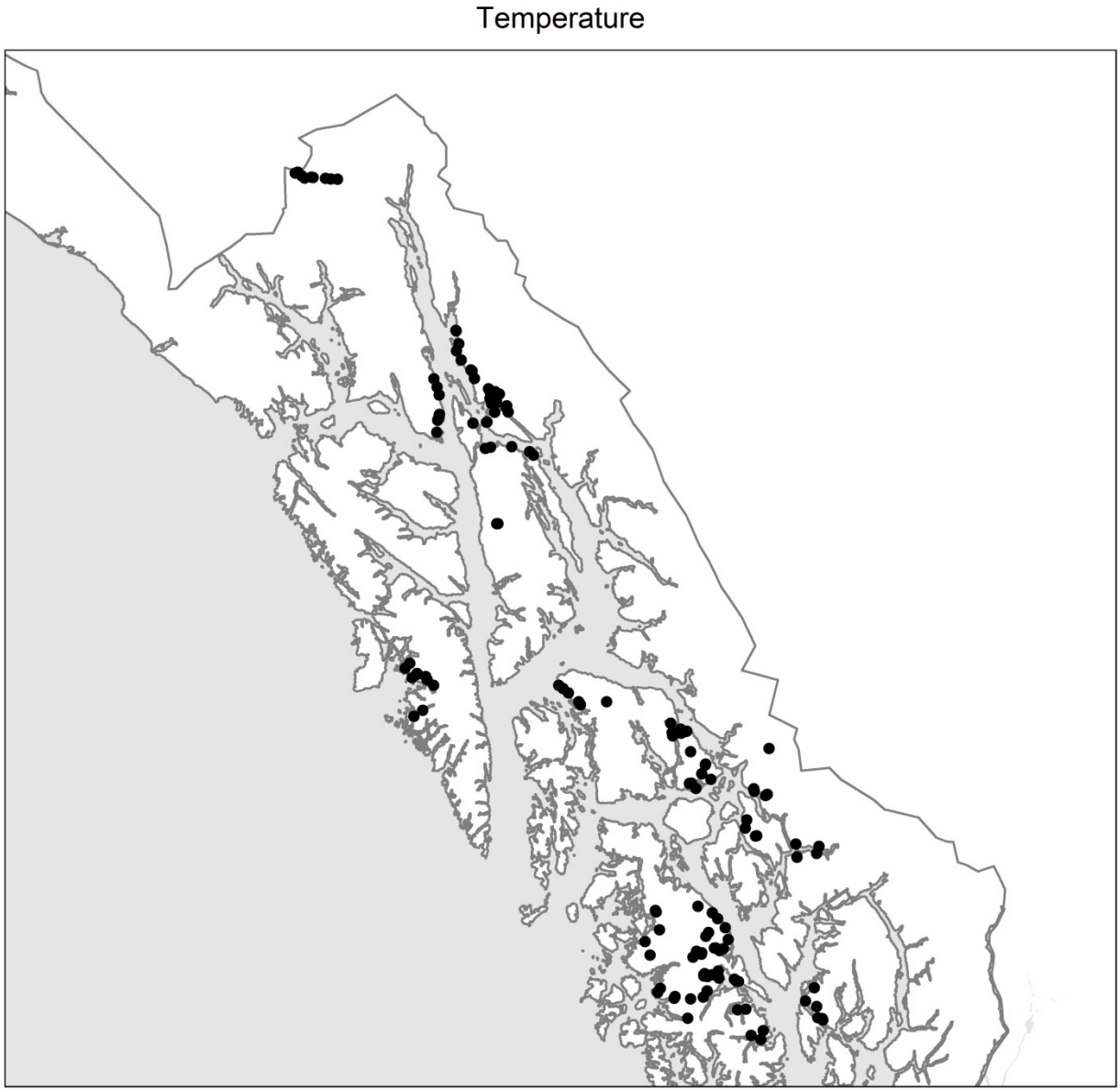


Figure 9. Sampling sites where temperature was measured at least once.

Data Sharing Challenges and Opportunities

This study identified many organizations in Southeast Alaska that are currently monitoring or previously monitored water, sediment, or tissue quality. Their historic and current efforts can supplement ADEC data to provide a more complete understanding of baseline environmental health in the region. We found that making historic data available was challenging, and more time and resources would be needed to fully capture the data that are available for the region. Some key challenges we encountered while attempting to obtain historic data included:

- Personnel turnover resulted in lost information about where data and metadata were located, and even what studies had been done.
- Technology changes (e.g. moving from hard copies to electronic data) made it difficult to obtain historic data.
- Information about collection protocols, analytical methods, and sampling locations (GPS) were often not collected and/or not stored with the final data reports and were particularly difficult to obtain.
- Staff could not dedicate the time that would have been required to locate and share old data sets.
- Organizations were unresponsive to requests for information about studies.

Ideally, organizations would continue to make their data available and share them with ADEC. However, the hurdles that we encountered while compiling historic data highlight several challenges that may slow or prevent *future* data sharing as well. Recognizing that some of the problems occur far upstream of the data sharing itself, we have organized these challenges into three categories: Data Collection, Data Storage, and Data Sharing (Table 1).

Table 1. Challenges to future data sharing.

Data Collection	Data Storage	Data Sharing
Collection methods and data quality don't meet standards.	Absent a rigorous data management system within an organization, staff turnover can result in the loss of information.	Organizations have their own private databases/storage systems.
Clear data quality objectives are not always produced.		Data sharing is not an institutional priority.
Standardized Quality Assurance Plans, including sampling and analytical methodology, are not always available and/or directly traceable to results.	Quality Assurance Plans and original laboratory reports are separated from data sets and final reports.	Submission to AWQMS requires training and time, and contributors currently need to go through ADEC to submit their data.
	Information about who collected the data is not clear (e.g. signature files).	

The challenges identified in Table 1 are a related to organizations' cultures and resources, and will require different approaches to address; however, some simple first steps can be taken to promote sharing by groups who are already collecting high quality data and are motivated to make it available. We suggest compiling and maintaining a list of contacts who have shared data in the past, and contacting them on a regular basis (e.g. semi-annually) to request any new data that have been collected. SEACC has begun to compile important contacts already as part of this project (Appendix 4). Second, we recommend streamlining the process of sharing data with ADEC for submission to AWQMS, such as by providing up-to-date templates online and recorded or live webinars with instructions. Alternatively, ADEC could increase internal capacity to accept data sets as organizations provide them and format them for AWQMS in-house. During the project period, SEACC went through multiple template iterations with ADEC, and updates are likely to continue in the future, so contributors would need to be kept up to date on the submission process. Importantly, providing the AWQMS upload template would help reinforce the type of information that should be recorded with data.

Additional strategies will have to be deployed over the long-term to overcome some of the more entrenched organizational behaviors that hinder data sharing. First, a concerted outreach effort by ADEC is needed to communicate the importance of data sharing. Many organizations collect data to address specific questions or for internal purposes, and sharing that data with the larger community is not a top priority, so their limited resources are not spent on the time and effort required to take that step. If agencies want to collect information from outside

organizations, there must be a perceived benefit, and access to larger, regional data sets is one of the most obvious potential benefits. Understanding these benefits will likely make it easier to convince organizations to expend the additional effort that is required to generate sharable data.

Second, data collection and storage protocols need to be communicated to potential data contributors. ADEC should share and reinforce minimum data collection standards, data storage (e.g. in Excel or CSV format at a minimum) and record-keeping practices (e.g. back-up documents, initial and signature pages, archiving Quality Assurance Plans and lab reports with final data sets and reports) that support data sharing. In addition to ADEC efforts, a network of water quality partners could promote high quality data collection and sharing by, for example, offering annual data collection and storage training workshops, a group subscription to AWQMS, and resource-sharing for site visits.

Finally, state and federal agencies should reconsider their data storage and sharing policies, which we found hindered them from sharing their own data. In our experience, the USFS and ADF&G's data storage systems were the most difficult to navigate. It appeared that data sets were kept in different departments, making even internal access difficult, and many data sets are not readily available to the public without agency staff responding to individual requests. Ideally, state and federal agencies would work together to house data in one place or develop a portal with access to all resources. Additionally, all agencies could require data sharing as a condition of grant agreements to ensure that all publicly funded data are publicly available.

Conclusions and Recommendations

During the project period, SEACC was able to obtain and submit over a dozen data sets to ADEC. Sample collection sites were distributed, albeit unevenly, across Southeast Alaska. Many sites were in transboundary watersheds where sampling was designed specifically to address mining concerns. The data included many different types of parameters, including physical parameters, metals, nutrients, organic matter, and other inorganics. Water column chemistry data were far more common than sediment and tissue data.

During the process of soliciting data, we found that many organizations collecting environmental data lacked adequate recordkeeping, document storage, and retrieval methods. Often supporting documents such as original lab results, field notes and data sheets, and quality assurance plans were either missing or separated from final reports. Many data sets lacked adequate sample collection and equipment information often just referring to "grab" or "composite." Sometimes this information was within the Quality Assurance Protocol Plans (QAPP) but not in the final reports. Many final reports lacked information on data quality flags, specific methods, reporting limits or compliance with other data quality objectives. Finally, staff turnover created and amplified gaps in data quality because knowledge about the studies and where relevant information was located was lost.

We recommend several specific actions to strengthen recordkeeping, storage, and retrieval of environmental data. First, document storage requirements should be explicit in QAPPs, specifically requiring the retention of a master file containing all project specific information. We would also recommend that QAPP review include the standardization of data collection forms to assure all information required in the QAPP is reflected on field sheets and in final data spreadsheets. Additionally, there needs to be greater standardization in how quality control samples are identified within reports. Field blanks and duplicates were often confused with laboratory generated blanks and duplicates. Training may be necessary to identify reporting limits, sampling methodology and data recording. Finally, we recommend that a list of participating staff along with copies of signatures and initials be included in the QAPP or within standard operating procedures so that greater traceability of data can be achieved.

This project made clear that sharing data by different organizations through a uniform process and platform can be very resource intensive if it is not planned for early in project development. As discussed above, many relevant pieces of information were not collected or lost. Having the AWQMS upload template available to all organizations collecting compliant data may help reinforce the type of data and metadata that should be collected and reduce the amount of time required to identify relevant information later. Additionally, some organizations did not have the staff time to dedicate to finding old reports and the extensive relevant information that is required for submission to AWQMS. Even if all of the relevant information was available, formatting data and linking report information with the AWQMS template requirements was time consuming, and more time could have been dedicated to formatting data that we obtained, but were not submitted within the project period.

We recognize that having high quality data centrally located is valuable for understanding baseline environmental conditions, temporal trends, and effects of human and natural impacts. The usability and sharing of data outside of project-specific goals should be emphasized early in project development. As investigators become aware of the AWQMS data set, it can be a valuable tool for project-specific evaluation and assessment to compare project data with overall expected ranges. We recommend that ADEC invest in communicating these benefits to outside organizations that can share their own data and take advantage of others' data when combined in AWQMS.

Appendices

A1.Data sets obtained and submitted

Data Source	Study Description	Contact
Hecla Mining Company	Study created baseline monitoring data for Hawk Inlet in order to track potential effects of mining operations. Associated with APDES monitoring program. Study location: Hawk Inlet, Admiralty Island Sampling period: 09/1/1984-09/27/2015 Parameters measured: dissolved metals in water column, total metals in sediment, total metals in invertebrate and fish tissue.	Mike Satre Office: 907.523.1410, Cell: 907.957.2149 msatre@hecla-mining.com Christopher Wallace, 907-790-8473, CWallace@Hecla-mining.com
Copper Fox (obtained through ADF&G Stikine River compilation)	Baseline aquatic studies for proposed Shaft Creek mine in the Stikine watershed, British Columbia. Study location: Shaft Creek and nearby streams and rivers Sampling period: 1/13/2005-11/28/2008 Parameters measured: metals, ions, physical parameters, nutrients	Jackie Timothy 907.465.4275 Jackie.timothy@alaska.gov
NovaGold (obtained through ADF&G Stikine River compilation)	Baseline aquatic studies for proposed Galore Creek mine in the Stikine watershed, British Columbia. Study location: Galore Creek and nearby streams and rivers Sampling period: 5/4/2004 – 10/27/2005 Parameters measured: metals, ions, physical parameters, nutrients	Jackie Timothy 907.465.4275 Jackie.timothy@alaska.gov
Takshanuk Watershed Council	Baseline stream quality data were established as part of a project to monitor anadromous fish habitat and population health in anticipation of mining activity.	Meredith Pochardt, 907-766-3542, Meredith@takshanuk.org

Data Source	Study Description	Contact
	Study location: Various Rivers and Streams near Haines Sampling period: 11/06/2011-08/27/2012 Parameters measured: dissolved metals, pH, alkalinity, total suspended solids, conductivity, oxidation reduction potential, temperature, turbidity, hardness in rivers/streams.	
Douglas Indian Association	Study to address whether or not current and historic mining activity pose a threat to traditional subsistence resources, areas, and tribal members eating traditional foods by measuring amounts of heavy metals in sediment. Study location: Sandy Beach, Juneau and Taku Inlet Sampling period: 08/12/2014-06/08/2016 Parameters measured: total metals in sediment	Kamal Lindoff Environmental Planner Office: 907-364-3567 Cell: 907-364-2917 klindoff-dia@gci.net Bernadine DeAsis, 907-364-2916, bdeasis-dia@gci.net
Craig Tribal Association	Basic water quality parameters measured as part of ongoing monitoring of impacts of climate change and regeneration of watersheds with important cultural values for local Tlingit and Haida peoples. Study location: Various streams near Craig Sampling period: 09/11/2013-10/06/2016 Parameters measured: stream conductivity, dissolved oxygen, nitrates, pH, phosphate, water temperature, turbidity	Maranda Hamme, 907-826-5125, epacoord@craigtribe.org
Central Council Tlingit Haida Indian Tribes of Alaska	Baseline water quality data collected for major transboundary rivers for informing management decisions and to protect against possible future pollution from upstream mining activity. Study Location: Stikine River, Taku River Sampling period: 11/03/2015-06/14/2016	Jennifer Hanlon, 907-463-7185 jhanlon@ccthita.org

Data Source	Study Description	Contact
	Parameters measured: dissolved metals, pH, conductivity, dissolved oxygen, water temperature, turbidity, salinity, organic carbon, ammonia, nitrates, alkalinity, and polycyclic aromatic hydrocarbons	
U.S. Forest Service	USFS undertook a synoptic survey of organic matter and nutrient concentrations in streams and rivers across SE AK. Sites were located at the mouths of streams. Samples were collected in spring and fall. Study Location: 60 streams and rivers across southeast Alaska Sampling Period: 2 time points in 2005 Parameters measured: Dissolved organic carbon	David D'Amore, ddamore@fs.fed.us
U.S. Forest Service	USFS has been conducting long-term monitoring of water quality and physical parameters in Redoubt Lake. Sampling occurs several times throughout the summer and fall. Study Location: Redoubt Lake Sampling Period: 1980-2016 (ongoing) Parameters measured: Temperature, conductivity, DO, pH, ammonium, nitrate+nitrite, phosphate, silica, TDN, UTN, calcium, magnesium, chlorophyll-a	Chris Leeseberg, cleeseberg@fs.fed.us, Ryan Dunn, ryandunn@fs.fed.us
U.S. Forest Service	The USFS collected basic stream water quality parameters as part of a project to develop a macroinvertebrate biological index for Alexander Archipelago streams. Most sites were visited only once, but a subset were visited 2 or 3 times. Study Location: 123 streams and rivers across Southeast Sampling Period: 2002-2004 Parameters measured: Dissolved oxygen, pH, Temperature, conductivity	Julianne Thompson jethompson02@fs.fed.us

Data Source	Study Description	Contact
University of Alaska Southeast	Grab samples for nutrients, organic matter, and turbidity samples were collected weekly from May through September; physical parameters measured in-situ to understand relationships among characteristics and with hydrology and catchment type. Study Location: 4 streams and rivers near Juneau Sampling Period: 2012 Parameters measured: temperature, specific conductivity, turbidity, DOC, TDN, NH4, NO3+NO2	Jason Fellman, jbfellman@alaska.edu
University of Alaska Southeast	Grab samples for nutrients, organic matter, and turbidity, and in-situ measurements of physical parameters were taken year-round, weekly during the summer and less frequently during the rest of the year to understand relationships among characteristics and with hydrology and catchment type. Study Location: 6 streams and rivers near Juneau Sampling Period: 2006-2007 Parameters measured: Temperature, turbidity, DOC, DON, DIN, SRP, Specific conductivity	Jason Fellman, jbfellman@alaska.edu
Tulsequah Chief Mine	Samples were collected as part of an aquatic environmental impact assessment of the Tulsequah Chief Mine (in the Taku watershed, British Columbia). Study Location: 4 sites on the Tulsequah River near the mine Sampling Period: 2008-2013 Parameters measured: alkalinity, pH, hardness, dissolved and total metals, fluoride, acidity, nitrate, nitrite, total organic carbon, carbonate, bicarbonate, hydroxide, sulfate, ammonia, ortho-	Jackie Timothy 907-465-4275 Jackie.timothy@alaska.gov

Data Source	Study Description	Contact
	phosphate, conductivity, total suspended solids, total dissolved solids, turbidity	
Sitka Conservation Society/ Southeast Alaska Watershed Coalition	Samples were collected in conjunction with the Global Rivers Observatory to generate baseline data. Study locations: Indian River Starrigavan Creek (Sitka) Sampling period: 2012-2013 (2014 samples collected, not analyzed yet) Parameters measured: ammonium, nitrate, nitrite, phosphate, silicate	Scott Harris, Scott.harris@oregonstate.edu

A2.Data sets obtained but not submitted

Organization	Description of Study/Data Set	Reason for not submitting	Contact
NovaGold (obtained through ADF&G Stikine River compilation)	2004-2005 Aquatic Baseline studies in Galore Creek and tributaries (fish tissue and sediment data)	Galore Creek tissue data did not have dates or exact sampling locations associated with it	Jackie Timothy 907.465.4275 Jackie.timothy@alaska.gov
ADF&G (Tulsequah and Taku Rivers compilation)	Water quality data from the Taku watershed related to Tulsequah River mining activity (various tributaries and mainstem, 1995-2007 for metals, ions, physical parameters, and nutrients.	Inadequate time during the project period to assess and organize data.	Jackie Timothy 907.465.4275 Jackie.timothy@alaska.gov
U.S. Geological Survey	Stikine River water quality monitoring 1975-1993	Data are available with QA/QC information on the USGS database	
U.S. National Park Service	Continuous stream temperature, dissolved oxygen, pH, conductivity in Indian River and Starrigavan Creek	Did not submit continuous data sets. Also, these are publicly available on the Southeast Alaska Inventory and Monitoring website: https://science.nature.nps.gov/im/units/sean/	Chris Sergeant, Christopher_sergeant@nps.gov

A3.Data sets identified but not obtained

Several studies and/or data sets were identified as existing and likely to meet AWQMS requirements, but were not obtained from host organizations. These are listed below, along with the reason they were not obtained.

Organization	Description of Study/Data Set	Reason for not obtaining	Contact
Data sets identified and pursued, but not obtained:			
U.S. Forest Service	Admiralty National Monument lakes study; 42 lakes sampled for water quality parameters. Sampling dates unknown – likely 1970's-1990's. Only summary report available.	Raw data could not be found in electronic format, USFS could not dedicate resources to find and dig up hard copies of data.	Barbara Adams, bjadams@fs.fed.us
U.S. Forest Service	Southeast AK lakes sampling 1975-1999; one or more of nutrients, physical parameters, vertical profile, zooplankton, chlorophyll, or light profiles.	Raw data could not be found in electronic format, USFS could not dedicate resources to find and dig up hard copies of data.	Barbara Adams, bjadams@fs.fed.us
U.S. Forest Service	Abandoned mines survey across Southeast for heavy metals in receiving environments in the 1980's.	Summary report with some concentration data was obtained, but no sampling dates, individual sample data, or method information could be found.	Julianne Thompson, jethompson02@fs.fed.us
U.S. Forest Service	Study Location: 60 streams and rivers across Southeast Alaska Sampling Period: 2 time points in 2005	D. D'Amore is still in the process of publishing data and preferred that it not be included in the survey yet.	David D'Amore, ddamore@fs.fed.us

Organization	Description of Study/Data Set	Reason for not obtaining	Contact
	Parameters measured: Total Nitrogen, Total Phosphorus		
Friends of Admiralty	Heavy metals data for sediment, water column, tissue in on/near Admiralty Island	Lack of supporting information on sample and analytical methodology, detection limits and data quality objectives. Some final data available at: http://www.friendsofadmiralty.org/hawkinlet.htm	KJ Metcalf, angkmj@yahoo.com
Yakutat Salmon Board	Water chemistry data for various waterbodies in the Yakutat Forelands	Organization no longer exists.	Larry Powell, mallottsgenstore@hughes.net
Coeur Alaska Mining Company	Total metals (sediment, fish tissue), EPT taxa, dissolved metals, chlorophyll-a in Sherman Creek, Ophir Creek, Upper East Slate Creek, Johnson Creek near the Kensington Mine site.	SEACC was told that data sets exist and could be shared, but did not receive them despite multiple requests. Final results are available at: http://dnr.alaska.gov/mlw/mining/largemine/kensington/pdf/kensapdes2016vol2.pdf	Kevin Eppers, 907-523-3328, KEppers@coeur.com
Alaska Department of Fish and Game	Sockeye subsistence program studies – lake profile data from multiple lakes	Could not track down data in table (non-pdf) form from ADF&G. Reports from each lake and year are available online. http://akssf.org/Default.aspx	

Organization	Description of Study/Data Set	Reason for not obtaining	Contact
		?Id=3011 (and links within to subsequent study phases)	
CCTHITA	Peterson Creek (Douglas) water quality data	No response received.	Desiree Duncan, dduncan@ccthita.org
Data sets identified but not pursued:			
Juneau Watershed Partnership	Duck Creek, Jordan Creek, water quality monitoring data	Data was previously submitted to ADEC as part of grant agreements.	Amy Sumner, juneauwatersheds@gmail.com
Southeast Alaska Watershed Coalition	Wrangell and Petersburg BEACHES data	Data was previously submitted to ADEC as part of grant agreements.	Rebecca Bellmore, Rebecca@sawcak.org
USGS	Water quality associated with gage stations in the region.	These data are publicly available and include QA/QC information.	https://www.waterqualitydata.us/

A4.List of contacts

Organization	Contact	Phone	Email
AK Department of Fish and Game	Micah Sanguinetti	907-225-2475	micah.sanguinetti@alaska.gov
AK Department of Transportation	Erik Norberg	907-465-6964	erik.norberg@alaska.gov
Central Council of Tlingit and Haida Indian Tribes of Alaska	Desiree Duncan	907-463-7183	dduncan@ccthita.org
Central Council of Tlingit and Haida Indian Tribes of Alaska	Jennifer Hanlon	907 463-7185	jhanlon@ccthita.org
Coeur Alaska Mining Company	Kevin Eppers	907-523-3328	KEppers@coeur.com
Contractor	Phyllis Weber Scannell	907-456-4105	Info will be at ADF&G Division of Habitat
Craig Tribal Association	Maranda Hamme	907 826-5125	epacoord@craigtribe.org
Douglas Indian Association	Kamal Lindoff	907-364-3567	klindoff-dia@gci.net
Douglas Indian Association	Bernadine DeAsis	907 364-2916	bdeasis-dia@gci.net
Friends of Admiralty Island	KJ Metcalf	907-500-2894	angkjm@yahoo.com
Hecla Mining Company	Mike Satre	907-523-1410	msatre@hecla-mining.com
Hecla Mining Company	Christopher Wallace	907-790-8473	CWallace@Hecla-mining.com
Juneau Watershed Partnership	Amy Sumner	907-205-4028	juneauwatersheds@gmail.com
Kai Environmental Consulting	Cathy Needham	907-723-4436	cathy@kaienvironmental.com
Nature Conservancy	Christine Woll	907-586-8623	cwoll@tnc.org
Prince of Wales Watershed Association	Brandy Prefontaine	907-205-4028	pow.watersheds@gmail.com
Southeast Alaska Watershed Coalition	Rebecca Bellmore	907-205-4028	rebecca@sawcak.org
Sitka Conservation Society	Scott Harris	907-747-7509	scott.harris@email.oregon.edu
Takshanuk Watershed Council	Meredith Pochardt	907-766-3542	meredith@takshanuk.org

Organization	Contact	Phone	Email
University of Alaska Southeast	Jason Fellman		jbfellman@alaska.edu
US Fish and Wildife Service	John Hudson	907-780-1169	john_hudson@fws.gov
US Forest Service	Barbara Adams	907-789-6252	bjadams@fs.fed.us
US Forest Service	Chris Leeseburg	907-747-4343	cleeseberg@fs.fed.us
US Forest Service	Dave D'Amore	907-586-7955	ddamore@fs.fed.us
US Forest Service	Emil Tucker	907-772-5874	etucker@fs.fed.us
US Forest Service	Jessica Davila	907-228-6275	jmdavila@fs.fed.us
US Forest Service	Julianne Thompson	907-772-5873	jethompson02@fs.fed.us
US Forest Service	Pete Schneider	907-789-6639	pschneider@fs.fed.us
US Forest Service	Ryan Dunn	907-747-4322	ryandunn@fs.fed.us
US Geological Survey	Randy Host	907-586-7216	rhost@usgs.gov
US National Park Service	Chris Sergeant	907-364-1591	christopher_sergeant@nps.gov
Yakutat Salmon Board	Larry Powell	907-784-3355	mallottsgenstore@hughes.net
Yakutat Tlingit Tribe	Matt Anderstrom	907-784-3238	manderstrom@ytttribe.org
City and Borough of Juneau Water Utility			

Suggested Contacts			
University of Alaska Fairbanks	Mark Wipfli		mark.wipfli@alaska.edu
University of Alaska Southeast	Sonia Nagorski		sanagorski@alaska.edu
University of Birmingham	Alexander “Sandy” Milner		a.m.milner@bham.ac.uk
US Geological Survey	Ed Neal		egneal@usgs.gov
Southeast Alaska Fish Habitat Partnership	Debbie Hart	907-723-0258	coordinator@sealaskafishhabitat.org

Email list (comma separated)

a.m.milner@bham.ac.uk,
angkjm@yahoo.com,
bdeasis-dia@gci.net,
bjadams@fs.fed.us,
cathy@kaienvironmental.com,
christopher_sergeant@nps.gov,
cleeseberg@fs.fed.us,
coordinator@sealaskafishhabitat.org,
CWallace@Hecla-mining.com,
cwoll@tnc.org,
ddamore@fs.fed.us,
dduncan@ccthita.org,
egneal@usgs.gov,
epacoord@craigtribe.org,
erik.norberg@alaska.gov,
etucker@fs.fed.us,
jbfellman@alaska.edu,
jethompson02@fs.fed.us,
jhanlon@ccthita.org,
jmdavila@fs.fed.us,
john_hudson@fws.gov,
juneauwatersheds@gmail.com,
KEppers@coeur.com,
klindoff-dia@gci.net,
mallottsgenstore@hughes.net,
manderstrom@ytttribe.org,
mark.wipfli@alaska.edu,
meredith@takshanuk.org,
micah.sanguinetti@alaska.gov,
msatre@hecla-mining.com,
pow.watersheds@gmail.com,
pschneider@fs.fed.us,
rebecca@sawcak.org,
rhost@usgs.gov,
ryandunn@fs.fed.us,
sanagorski@alaska.edu,
scott.harris@email.oregon.edu

Addendum to:

Southeast Alaska Water Quality Inventory

Alaska Clean Water Actions Grant no. 17-13

Addendum completed by

State of Alaska, Department of Environmental Conservation

Terri Lomax

February 13, 2018

One additional dataset was imported into AWQMS by DEC in November 2017. Dataset NovaGold: 2004-2005 Aquatic Baseline studies in Galore Creek and tributaries (fish tissue and sediment data) was obtained by SEACC but not imported, see Appendix 2 in final report. With the import of this additional dataset the project totals need to be updated. The new project totals are described below.

15 Data Sources

Data records (unique results): 148,070

- Rivers/Stream: 100,920
- Lake: 39,502
- Estuary: 6,743
- Ocean: 895

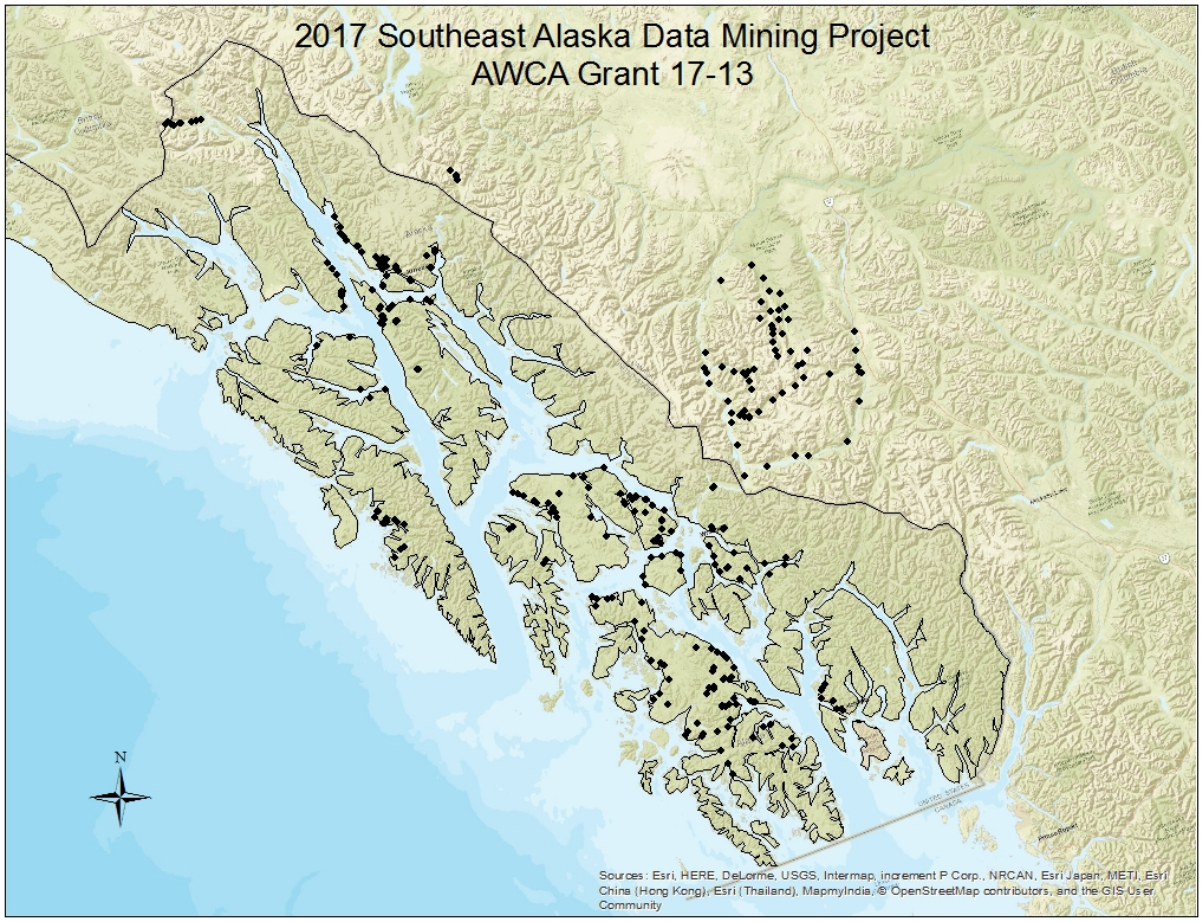
Unique Monitoring Stations: 331

- 73 in British Columbia
- 258 in Alaska

Characteristics (83 unique), # of records	Sediment	Tissue	Water	Total
Acidity			930	930
Alkalinity, bicarbonate			211	211
Alkalinity, carbonate			90	90
Alkalinity, Hydroxide			82	82
Alkalinity, total			1,399	1,399
Aluminum			2,291	2,291
Ammonia			1,290	1,290
Ammonium			188	188
Antimony			2,290	2,290
Arsenic	29		2,290	2,319
Arsenic, Inorganic	9			9
Barium			2,358	2,358
Beryllium			2,290	2,290
Bicarbonate			129	129
Bismuth			2,288	2,288
Boron			2,290	2,290
Bromide			937	937
Cadmium	360	1346	2,972	4,678
Calcium			3,067	3,067
Calcium carbonate			372	372
Carbonate			129	129
Chemical oxygen demand			350	350
Chloride			1,060	1,060
Chlorophyll a, corrected for pheophytin			619	619
Chromium			2,298	2,298
Cobalt			2,289	2,289
Conductivity			10,345	10,345
Copper	360		3,067	3,427
Cyanide			952	952
Dissolved oxygen (DO)			8,951	8,951
Fluoride			950	950
Hardness, carbonate			68	68
Hydroxide			129	129
Inorganic nitrogen (ammonia, nitrate and nitrite)			203	203
Inorganic nitrogen (nitrate and nitrite)			514	514
Iron			2,314	2,314
Kjeldahl nitrogen			936	936

Lead	360		3,066	3,426
Lithium			2,290	2,290
Magnesium			3,060	3,060
Manganese			2,290	2,290
Mercury	355	1,069	2,925	4,349
Methylmercury(1+)	9			9
Molybdenum			2,290	2,290
Nickel			2,290	2,290
Nitrate			961	961
Nitrite			956	956
Nitrogen			1,715	1,715
Organic carbon			757	757
Organic Nitrogen			187	187
Orthophosphate			256	256
Oxidation reduction potential (ORP)			33	33
pH			7,974	7,974
Phosphate-phosphorus			1,102	1,102
Phosphorus			2,632	2,632
Potassium			2,291	2,291
Salinity			38	38
Selenium	20		2,276	2,296
Silica			373	373
Silicate			112	112
Silicon			2,283	2,283
Silver	20		2,290	2,310
Sodium			2,277	2,277
Soluble Reactive Phosphorus (SRP)			118	118
Specific conductance			294	294
Strontium			2,274	2,274
Sulfate			1,094	1,094
Sulfur			377	377
Temperature, water			10,936	10,936
Thallium			2,290	2,290
Tin			2,290	2,290
Titanium			2,284	2,284
Total dissolved solids			896	896
Total hardness			901	901
Total Nitrogen, mixed forms (NH3), (NH4), organic, (NO2) and (NO3)			103	103
Total suspended solids			1,045	1,045
True color			902	902

Turbidity			1,301	1,301
Uranium			2,290	2,290
Vanadium			2,290	2,290
Zinc	351		2,056	2,407
Zirconium			379	379
Grand Total	**1,873**	**2,415**	**143,782**	**148,070**



Updated map will all monitoring locations.